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ABSTRACT

This agricultural curriculum guide on horticulture for secondary students is one of six developed for inservice teachers at Marianas High School in Saipan. The guide provides the rationale, description, goals, and objectives of the program; the program of studies and performance objectives by levels; samples of lesson plans for effective delivery of instruction; and a listing of references. Concepts covered include orientation to horticulture, terminology, plant classification, horticulture mechanics, pest control, plant propagation, field preparation, and soils. Classroom activities are combined with gardening experiences. Appended materials include lesson plans, student activities, and tests. (CT)

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CURRICULUM GUIDE

Agriculture: Horticulture
Secondary Schools

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FOREWORD

This document, Curriculum Guide for Agriculture (Horticulture) is one of several guides developed during the 1980 Summer Session held for in-service teachers at Marianas High School in Saipan. The in-service workshop was made possible through a federal project titled, Vocational Education Personnel Development in the Pacific Basin, under Section 135 of Title II of the Education Amendment Act of 1976 (P.L. 94-482).

Experienced teachers and administrators representing the secondary schools of the Commonwealth of the Northern Marianas Islands and the Trust Territory of the Pacific Islands developed the guide to establish curriculum standards for vocational education in their respective school systems. It is hoped that this guide will help teachers and administrators improve instruction as well as establish a base for future curriculum development efforts.

The guide provides the rationale, description, goals and objectives of the program; the program of studies and performance objectives by levels; samples of lesson plans for effective delivery of instructions; and a listing of references.

Constructive comments and recommendations will be appreciated. These should be forwarded to either the Department of Education, Commonwealth of the Northern Mariana Islands or the Bureau of Education, Trust Territory of the Pacific Islands.

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This curriculum guide for Horticulture is the result of the cooperative efforts of many people in the Commonwealth of the Northern Mariana Islands, Trust Territory of the Pacific Islands, and the State of Hawaii. Experienced teachers, in cooperation with the Commonwealth of the Northern Mariana Islands, Trust Territory of the Pacific Islands, and University of Hawaii personnel, have contributed toward the development of this guide. The following persons are acknowledged as participants, consultants, evaluators, and support staff.

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INTRODUCTION

Rationale

To attain economic self-sufficiency in the Commonwealth of the Northern Mariana Islands (CNMI) and the Trust Territory of the Pacific Islands (TTPI), there is a need to expand the economic activity, especially in the private sector. Although the visitor industry can lead the way, continued development must be maintained and expanded in the services, trades, construction, manufacturing, fishery and agriculture. The potential for development in agriculture is self-evident in comparing the pre-war and post-war era.

The report, the Role of Agriculture in Northern Mariana Islands, presented to the U. S. Department of Agriculture in September of 1979 shows the following comparative data:

	Swine	Cattle	Fruits	Vegetables
Pre-war	24,070	14,580	463	19,384
Post-war	2,500	7,250	44	824
Lost Potential	89.61%	50.27%	90.49%	95.74%

NOTE: All figures are in tons.

Also, a comprehensive socio-economic study of CNMI, prepared by Robert Nathan Associates of Washington, D.C., identifies three viable areas for development. They are in tourism, fishery, and agriculture.

The Trust Territory Advisory Council for Vocational Education, FY 1979 10th Annual Report, states that with the changing emphasis from government to private employment, it is essential that vocational education be a means for students in high school, which has been the principal area for job skill development, to attain saleable skills for direct entry into the job market.

Agriculture education in the secondary school of both the CNMI and TTPI can make a significant contribution toward preparing students for job entry employment as well as for self-employment.

Description

The Agriculture Education Program in the secondary schools of CNMI and TTPI is a study of plants and animals primarily for socio-economic development. The curriculum for agriculture is sequentially developed so that students can progress according to their individual interests, needs and capabilities. The scope and sequence for the agriculture curriculum is designed for beginning students at Level I, for those pursuing agriculture as a career at Level II and those seeking employment at Level III.

This Curriculum Guide for Agriculture (Horticulture) is designed for the study of plants only. It is hoped that a curriculum guide for animals will be developed in the near future.

Goal

The goal of agriculture education is to develop skills and incentives to prepare the student for entry into an increasingly complex job market in the developing economy of the islands.

Objectives

1. Equip individuals with marketable skills.
2. Strengthen the relationship of education and work.
3. Furnish students with information about nature of work and work opportunities for today and in the future.
4. Develop and apply decision making skills.
5. Develop leadership skills.
6. Assist the development of basic literacy skills required to meet job specifications.
7. Promote and support the values of free enterprise in a democratic society.

PROGRAM OF STUDY

COURSE TITLE:

HORTICULTURE I

COURSE DESCRIPTION:

Horticulture I is a vocational course designed to introduce the student to the horticultural field and to gain rudimentary skills needed in this occupational area. The main areas covered include orientation, terminology, plant classification, horticulture mechanics, pest control, plant propagation, field preparation, and soils. Classroom activities are combined with gardening experiences.

COURSE GOAL:

The goal of Horticulture I is to introduce the student to the field of horticulture. Through learning about horticulturally related occupations, skills requirements, and the work environment, the student will be able to determine if horticulture represents a viable career alternative.

COURSE OBJECTIVES:

After completion of this course, the student will be able to:

1. Make a wise career choice,
2. Classify plant botanically and horticulturally,
3. Identify major plant parts and explain their functions,
4. Propagate some plant sexually and asexually,
5. List, describe, identify, or name factors responsible for soil formation, soil profile, components of soil, soil texture, kinds of fertilizers, and methods of fertilizer application,
6. Identify common insects and weeds, describe how insects damage plants, list types of insect life cycles, identify some harmful and beneficial insects, describe methods of weed control, and control weeds manually, and
7. List, name, describe, state, demonstrate, or perform site selection, land clearing, cultivation techniques, field preparation, and garden bed preparation.

COURSE OUTLINE:

Unit I - Orientation

A. Terminology

1. Agriculture
2. Horticulture

B. Horticulture Program

1. Program Outline
2. School Policies

Unit II - Plant Growth and Development

A. Classification of Plants

1. Botanical Classification
2. Horticultural Classification

B. Morphology of Plants

1. Roots
2. Stems
3. Leaves
4. Flowers

Unit III - Plant Propagation

A. Introduction to Sexual Plant Propagation

1. Seeds
2. Reproductive Cycle

B. Introduction to Asexual Plant Propagation

1. Cuttings
2. Budding and Grafting

Unit IV - Soils

A. Nature and Property of Soils

1. Factors responsible for soil formation
2. The soil profile
3. Components of soil
4. Soil texture

B. Fertilizers and Its Application

1. Fertilizers in the soil
2. Organic fertilizers
3. Inorganic fertilizers
4. Methods of Application

Unit V - Pest Control

A. Insects

1. Parts of an insect
2. How insects damage plants
3. Harmful and beneficial insects
4. Life cycles

B. Weeds and their control

Unit VI - Field Preparation

A. Land Clearing

B. Cultivation

1. Field Preparation
2. Garden Bed Preparation

Unit VII - Horticulture Mechanics

A. Names and Functions of Tools

1. Gardening Tools
2. Carpentry Tools
3. Mechanic Tools

B. Handling of Tools

1. Safety
2. Maintenance

Unit: I Orientation

Major Objective: After completion of this unit, the student will be able to make a wise career choice.

Major Concept: A well-informed student will be able to make a wise career choice.

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Terminology	Identify agricultural and horticultural terms	
1. Agriculture	Define the following terms: A. Agriculture B. Commercial Agriculture C. Subsistance Agriculture	Lecture-Handouts: Agricultural terms Ref.: (41):1-7 Field Trips: Farms and backyard gardens
2. Horticulture	Define Horticulture List types of plants: A. Vegetable B. Fruits C. Ornamentals	Lecture-Handouts: Horticulture terms, basic principles of horticulture Handout on horticultural terms Ref.:(41):8-10 Field trip: School fields to view crops Student Activity: Identify horticultural crops

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
B. Horticulture Program	State the goals of the horticulture program	
1. Program Outline	List the units in the horticulture program	Lecture-Handouts: Horticulture curriculum
	List the requirements of the horticulture program	Discussion on school policies
		Handouts on the Program outline and school policies
2. School Policies	Obey the school policies	Ref.:(41):1-27

Unit: II Plant Growth and Development

Major Objective: The student will be able to classify plant botanically and horticulturally, identify major plant parts, and explain the functions of the major plant parts

Major Concept: Knowledge of plant growth and development enhances optimum growth.

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Classification of Plants	Classify plants botanically and horticulturally	
1. Botanical Classification	Classify a plant botanically	Lecture: Plant classification system; discussion on classification systems, films Ref.:(27):H01-B1-U1-TM1 Student Activity: Collect vegetables and segregate them by horticultural groupings
2. Horticultural Classification	Classify crops horticulturally	
B. Morphology of Plants	List major plant parts and explain their function	
1. Roots	List the functions of primary and secondary roots	Lecture-Handouts: Functions of roots Handout on roots Ref.: (30):124 Student Activity: Collect and identify types of roots
	Identify and give examples of aerial, fibrous, adventitious, tap, and aquatic roots	

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Stems	Explain the functions of stems Distinguish between types of stems Describe and give examples of modified stems	Lecture: Functions of stems; types of stems Ref.: (41):120 Student Activity: Collect and identify different types of stems
3. Leaves	Explain functions of leaves Identify major parts of leaves Identify different types of leaves	Lecture-Handouts: Functions of leaves Handout on leaf types and functions Ref.: (30):253; (40):129 Student Activities: Collect and identify different leaves Observe leaves under a magnifying glass
4. Flowers	Identify parts of a flower and describe its function Distinguish between types of flowers	Lecture: Parts of flowers and their function; Types of flowers Ref.: (30); (40) Student Activities: Collect different types of flowers Identify the parts of the flower

Unit: III Plant Propagation

Major Objective: The student will be able to propagate some plants sexually and asexually

Major Concept: Plant propagate either by seed or by vegetative means

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Introduction to Sexual Plant Propagation	Define "sexual propagation" and give examples of plants which are usually propagated sexually	
1. Seeds	Name the parts of the seed List two reasons for propagating plants by seed Name two seed propagation techniques List the advantages why plants are propagated from seeds Give the functions of the major parts of a seed	Lecture-Handout: Parts of a seed; functions; Introduction to sexual propagation Handout on seeds Ref.: (27): Blk III, Unit I Demonstration: Seed parts Student Activities: Collect and identify seeds Name the parts of a seed

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Reproductive cycle	Describe the reproductive cycle of plants	Lecture-Handout: Reproductive cycle Handouts on life cycle Ref.: (27): Blk. III, Unit I Student Activities: Plant seed and record growth Germination test Ref.: (10)
B. Introduction to Asexual Plant Propagation	Define "asexual propagation" and list methods of asexually propagating plants	
1. Cuttings	Name the materials and tools used in propagation by cuttings Propagate some plants by cuttings	Lecture-Handout: Propagation by cuttings Ref.: (27): Blk IV, Unit II Demonstration: Use of materials and tools Student Activity: Propagate some plants by cuttings
2. Budding and Grafting	Name the materials and tools used in budding and grafting Name the basic methods of budding and grafting Perform a bud or a graft	Lecture-Handout: Budding and grafting techniques Handouts of diagrams of methods Ref.: (27): Blk. IV, Unit V Demonstration: Use of materials and tools Demonstration of some techniques Student Activity: Perform a bud or graft

Unit: IV Soils

Major Objective: The student will be able to list, describe, identify, or name factors responsible for soil formation, soil profile, components of soil, soil textures, kinds of fertilizers, and methods of fertilizer application

Major Concept: Knowledge of soils is essential for optimum productivity

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Nature and Property of Soils	List factors responsible for soil formation, identify characteristics of the soil horizons, name components of soils, name classifications of soil by texture and water	
1. Factors responsible for soil formation	List factors responsible for soil formation Name three types of rock from which parent material originates State facts concerning the effect of climate in soil formation State at least two facts concerning the effects of plants and animals in formation of soils	Lecture-Handout: Factors responsible for soil formation Ref.: (8): 1-24; (24); (27):Unit VI; H01-B6-U1-1

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
	State facts concerning the effects of topography in soil formation	
2. The Soil Profile	List three horizons found in the soil profile Describe characteristics of the A, B, and C horizons in the soil profile Identify the A, B, and C horizons in the soil profile	Lecture-Handout: Soil profile Handouts on the soil profiles Ref.: (24); (27): H01-B6-U1-5 and H01-B6-B1-6
3. Components of Soil	Name four components of soil Describe characteristics of mineral matter, organic matter, air, and soil water as components of the soil	Lecture-Handout: Components of soil Information sheet Ref.: (24); (27):H01-B6-U1-TM2
4. Soil Textures	Name five soil textures Determine and name soil texture by feel Identify various sizes of soil particles	Lecture-Handout: Soil Texture Ref.: (8); (24); (27):Blk VII, Unit I, 7 and 8 Demonstration: Determination of soil texture by feel Student Activity: Determination of soil texture by feel
B. Fertilizers and Its Application	List benefits and functions of fertilizers Differentiate between organic and inorganic fertilizers Apply fertilizers correctly	

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
1. Fertilizers in the soil	List things that may happen to nutrients that are released in available forms and find their way into the soil solution List the basic functions of fertilizers and the two basic classifications of fertilizers List how fertilizers improve crop production State factors to consider in choosing fertilizers	Lecture-Handout: Fertilizers in the soil Handouts Ref.: (24); (27):H01-B7-U2-7 and H01-B7-U2-8.
2. Organic Fertilizers	List sources of organic matter Identify organic fertilizers List factors that affect the rate of decomposition of organic matter Describe the nature and value of humus Describe the process of green manuring Make their own compost	Lecture-Handout: Organic fertilizers Discussion on organic matter Ref.: (24); (27):H01-B7-U2-7 and H01-B7-U2-8 Student Activity: Make compost with available organic material
3. Inorganic Fertilizers	List primary, secondary, and trace elements in inorganic fertilizers List commercial fertilizers that are available on the island	Lecture-Handout: Inorganic fertilizers Discussion on availability of fertilizers Handouts Ref.: (24); (27):H01-B7-U3-8 and H01-B7-U3-9

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
4. Methods of Application	List methods of applying fertilizers and give examples of each method Apply fertilizers correctly	Lecture-Handout: Fertilizer application methods Ref.: (27):H01-B7-U4-1 Demonstration: Application of fertilizers Student Activity: Fertilizer various crops

Unit: V Pest Control

Major Objective: The student will be able to identify insects and weeds, describe how insects damage plants, list types of insect life cycles, identify some harmful and beneficial insects, describe methods of weed control, and control weeds manually

Major Concept: Plant pests retard growth and development of plants

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Insects	To identify and explain the functions of the three major parts of an insect	
1. Parts of an insect	Identify the head Identify the thorax Identify the abdomen	Lecture-Handout: Insect morphology Ref.: (27):HO1-B1-U4-1 and HO1-B1-U4-12; and (41):152-167 Demonstration: Dissect an insect and explain the function of the major parts
2. How insects damage plants	Describe the function of the head Describe the function of the abdomen	Student Activity: Collect and identify common insects
3. Harmful and beneficial insects	List and identify beneficial and harmful insects	Lecture-Handout: Common harmful and beneficial insects Ref.: (27):HO1-B1-U4-1; (41):152-167 Student Activity: Separate identified insects as beneficial or harmful

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
4. Life Cycles	List the various types of life cycles insects may have	Lecture: Insect life cycle Ref.: (27):HO1-B1-U4-1 and HO1-B1-U4-12; (41):152-167
B. Weeds and their control	Define weeds	Lecture: Weeds and Weed Control Ref.: (3):22; (27):HO1-B1-U5-1 and HO1-B1-U5-9, and (41):146-151
	List problems caused by weeds	
	Describe methods of weed control	Demonstration: Proper use of garden tools for weed control
	Control weeds manually	Student Activity: Control weeds with hand tools

Unit: VI Field Preparation

Major Objective: The student will be able to list, name, describe, state, demonstrate, or perform the following: choosing a site, land clearing, cultivation, field preparation, and garden bed preparation

Major Concept: A well-prepared land gives optimum yields

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Land Clearing	List factors to be considered in selecting a garden site List types of land that must be cleared before it can be farmed List and identify what tools or equipment to be used in various land clearing methods List methods of land clearing List advantages and disadvantages of using different methods of land clearing	Lecture and Handout: Lecture and discussion on landclearing Ref.: (41):33-34; (31) Student Activity: Clear a small parcel of land
B. Cultivation	Prepare a field for planting Prepare a garden for planting	

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
1. Field Preparation	Identify disking, harrowing, and plowing techniques Explain the use of the tractor in field preparation List methods of preparing land for planting	Lecture: Field preparation Ref.: (41) Field Trips: Local farms to observe operations
2. Garden Bed Preparation	List planting methods Line crops for planting in the garden List and prepare types of seedbeds in field and nursery Water and fertilize plants in the field or nursery	Lecture and Handout: Garden beds Discussion on types used at students' homes Ref.: (41) Student Activity: Prepare land for gardening Planting

Unit: VII Horticulture Mechanics

Major Objective: The student will be able to identify, properly use, and maintain common garden, carpentry and mechanic tools

Major Concept: Use of the proper tool increases efficiency

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Names and functions of tools	Identify and properly use common garden carpentry, and mechanic tools	
1. Garden tools	Identify common garden tools Demonstrate the proper use of garden tools	Lecture and Handout: Garden tools Ref.: (32):410-610;(34):66-122; (41):14-15 Demonstration: Use of tools in the garden Student Activity: Select and use the proper tool in the school garden
2. Carpentry tools	Identify common carpentry tools Demonstrate the proper use of carpentry tools	Lecture and Handout: Carpentry tools Ref. (32):410-610;(34):66-122; (41):14-15 Demonstration: Use of carpentry tools in the shop

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
		Student Activity: Properly use carpentry tools
3. Mechanic tools	Identify common mechanic tools Use mechanic tools properly	Lecture and Handout: Filmstrip from NASCO Demonstration: Use of mechanic tools Student Activity: Properly use mechanic tools
B. Handling of Tools	Demonstrate skills in handling tools List reasons for caring for tools properly	
1. Safety	Memorize all of the safety rules Follow all of the safety rules daily	Lecture and Handouts: Lecture on safety and a discussion on safety objectives Handout on safety rules Ref.: (34):23-48 Student Activity: Practice safety rules in the shop
2. Maintenance	Maintain tools properly	Lecture and Handouts: Lecture on maintenance and a discussion of the maintenance program Provide self-constructed information sheet Student Activity: Maintain tools properly

COURSE TITLE:

HORTICULTURE II

COURSE DESCRIPTION:

Horticulture II is a vocational course that emphasizes the theories and practices necessary for the economic production of horticultural crops. The areas of study include plant growth and development, plant propagation, soils, pest control, field preparation, horticulture mechanics, and farm management. Classroom activities are combined with practical field experiences.

COURSE GOAL:

The goal of Horticulture II is to give the student career training through the practical application of horticultural techniques and theories. Through learning about plants and factors that make plants grow better, mechanics, and farm management, the student will be able to apply horticultural principles to obtain higher yields.

COURSE OBJECTIVES:

After completing Horticulture II, the student will be able to:

1. Apply scientific principles in cultivating economic crops,
2. Reproduce plants economically by sexual and asexual means,
3. Apply necessary nutrients for optimum growth of economic crops,
4. Identify and control pests of economic crops,
5. Prepare the field for optimum productivity by proper cultivation, crop rotation, and irrigation practices,
6. Maintain and utilize equipment properly, and
7. Develop plans for some farm operations and keep simple records.

COURSE OUTLINE:

Unit I - Plant Growth and Development

A. Physiology

1. Photosynthesis
2. Respiration

B. Food and Water Transport

1. Absorption
2. Translocation
3. Transpiration

Unit II - Plant Propagation

A. Principles of Sexual Propagation

1. Seed Parts
2. Good Seed Characteristics
3. Germination

B. Pollination and Fertilization

1. Flower Parts
2. Types of Flowers
3. Pollinating Agents
4. Fertilization

C. Genetics

1. Genetic terms
2. Monohybrid Crosses
3. Dihybrid Crosses

D. Principles of Asexual Propagation

1. Mitosis
2. Clones
3. Reasons for utilizing asexual propagation techniques

E. Methods of Asexual Propagation

1. Layering
2. Cuttings
3. Grafting and Budding
4. Micropropagation
5. Division and Separation

Unit III - Soils

A. Deficiency Symptoms

1. Macronutrients
2. Micronutrients

B. Fertilizer Types and Application Techniques

1. Organic
2. Inorganic

C. Soil Testing

1. Soil Sampling
2. Soil pH
3. Soil Analysis Service

D. Computation of Fertilizer Requirements

1. Calibration
2. Calculating Fertilizer Needs

Unit IV - Pest Control

A. Pesticides

1. Classification
2. Methods of Application
3. Safety

B. Insects

1. Classification
2. Methods of Control

C. Diseases

1. Causal Agents
2. Methods of Control

D. Weeds

1. Classification
2. Methods of Control

Unit V - Field Preparation

A. Cultivation

1. Land Clearing
2. Terracing
3. Land Preparation

B. Crop Rotation

1. Crop Selection
2. Land Division

C. Irrigation

1. Methods of Irrigation
2. Drainage

Unit VI - Horticulture Mechanics

A. Identification of Farm Equipment

1. Tractors
2. Tillers
3. Lawn mowers
4. Power Tools

B. Safety

1. Handling
2. Rules

Unit VII - Farm Management

A. Basic Planning

1. Goal Setting
2. Scheduling

B. Record Keeping

1. Crop Records
2. Cash Records

Unit: I Plant Growth and Development

Major Objective: The student will be able to apply scientific principles in cultivating economic crops

Major Concept: Knowledge of plant physiology aids in maximizing crop growth and development

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Physiology	Describe the photosynthetic and respiratory processes in plants	
1. Photosynthesis	Define photosynthesis Write out the formula for photosynthesis Identify the end products of photosynthesis List factors that affect photosynthesis Identify the part(s) of the plant in which photosynthesis takes place	Lecture and Handout: Photosynthesis Ref.: (27):HOI-B12-U2-1; (30):11-13,54, and 194

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Respiration	Define respiration Differentiate between photosynthesis and respiration Write out the formula for respiration List factors that affect respiration	Lecture and Handout: Respiration Ref.: (17):107-109; (27):HOI-B2-U3-1
B. Food and Water Transport	Describe absorption, translocation, and transpiration processes in plants	
1. Absorption	Define absorption Describe the different processes of absorption Write out factors causing diffusion and osmosis	Lecture and Handout: Absorption Ref.: (18):97-98; (27):HOI-B2-U4-1; (30):187
2. Translocation	Define translocation List major causes of water movement in plants Name the tissues responsible for translocation Describe the functions of phloem and xylem tissues	Lecture and Handout: Translocation Ref.: (18):98-100; (27):HOI-B2-U4-1

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Transpiration	Define transpiration List factors causing transpiration Label parts of a stomate	Lecture and Handout: Transpiration Ref.: (18):100; (27):HOI-B2-U9-1

Unit: II Plant Propagation

Major Objective: The student will be able to reproduce plants economically by sexual or asexual means

Major Concept: Knowledge of propagation methods aids in reproducing plant economically

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Principles of Sexual Propagation	List and describe major seed parts and functions, identify good seeds, and germinate seeds	
1. Seed Parts	Label the parts of a seed Describe the function of each seed part	Lecture and Handout: Seed morphology and function Ref.: (10):3, 10, and 11; (27):HOI-B3-V2-4; (30):255-295 Demonstration: Name the parts of a seed Student Activity: Observe a seed under a magnifying glass or microscope Collect different seeds and identify their parts

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Good Seed Characteristics	Identify good seed characteristics Define viable seeds Store seeds Order seeds from a catalog	Lecture and Handout: Seeds and how to order them Student Activity: Order seeds from a seed catalog
3. Germination	List factors affecting seed germination Determine germination percentages of certain seeds	Lecture: Seed germination and conditions needed for germination Ref.: (10):149; (27):HOI-B3-V2-8
B. Pollination and Fertilization	Identify flower parts and the processes of pollination and fertilization	
1. Flower Parts	Identify flower parts and function	Lecture and Handout: Flower parts and functions Ref.: (10):9-11; (40); (41): and (42)
2. Types of Flowers	Classify types of flowers according to structure and function	Lecture and Handout: Types of Flowers Ref.: (40):131-136 Student Activity: Collect types of flowers Observe flower parts under magnifying glass or microscope

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Pollinating Agents	Identify different types of pollen carriers List reasons why pollen carriers are important	Lecture and Handout: Pollen carriers Ref.: (40):138
4. Fertilization	Describe the fertilization process in the ovary	Lecture and Handout: Fertilization of Plants Ref.: (10):1-12; (30):274-276

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO	SUGGESTED LEARNING ACTIVITIES
C. Genetics	Identify different methods of plant inheritance	
1. Genetic terms	Define genetic terms	Lecture and Handout: Terminology pertinent to genetics Ref.:(17): 315-325; 366-386; (18): 380-390
2. Monohybrid Cross	Solve a monohybrid cross problem	Lecture: Monohybrid cross Ref.: (13):96-97; (30): 312-319 Student Activity: Cross breeding plants Solve a monohybrid cross problem
3. Dihybrid Cross	Solve a dihybrid cross problem	Lecture: Dihybrid Ref.: (13):97-98; (30):321-330 Student Activity: Solve a dihybrid cross problem
D. Principles of Asexual Propagation	Describe principles of asexual plant propagation	
1. Mitosis	Define mitosis List the end-products of mitosis Identify areas where mitosis takes place	Lecture and Handouts: Process of cell division Ref.: (30):16-22

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO	SUGGESTED LEARNING ACTIVITIES
2. Clones	Define clone Identify plants that can be vegetatively reproduced	Lecture: Asexual propagation and clones Ref.: (10):182-187
3. Reasons for Utilizing Asexual Propagation Techniques	List advantages and disadvantages for utilizing asexual propagation techniques	Lecture: Asexual propagation Ref.: (10):181-187; (30):244-252
E. Methods of Asexual Propagation	List and describe various methods of asexual propagation Propagate plants asexually	
1. Layering	Define layering Identify types of layering List limitations of layering List factors affecting propagation by layering Propagate plants by layerage	Lecture and Handout: Layerage Ref.: (10):455-474 Demonstration: Methods of layering Student Activity: Perform a layer
2. Cuttings	Define cutting List factors that affect rooting of cuttings Propagate plants by cuttings	Lecture and Handout: Cuttings Ref.: (10):274-310 Demonstration: Types of cuttings Wounding Student Activity: Propagate plants from cuttings

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO	SUGGESTED LEARNING ACTIVITIES
3. Grafting and Budding	Define grafting and budding List limitations of grafting and budding List factors affecting grafting and budding Identify types of grafts and buds Propagate plants by grafting or budding	Lecture and Handout: Grafting and Budding Ref.: (10):314-361 Demonstration: Materials used in grafting and budding Grafting and budding techniques Student Activity: Propagate a plant by grafting or budding
4. Micropropagation	Define micropropagation Describe the techniques of micropropagation List advantages and disadvantages of using micropropagation	Lecture: Micropropagation Ref.: (10):509-529
5. Division and Separation	Define division and separation Describe the techniques of division and separation List the advantages and disadvantages of division and separation Propagate a plant by division or separation	Lecture: Division and Separation Ref.: (10):499-503 Demonstration: Division and separation techniques Student Activity: Propagate at least one plant by division or separation

Unit. III Soils

Major Objective: The student will be able to apply necessary nutrients for optimum growth of economic crops

Major Concept: Knowledge of plant nutrients lead to higher yields

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Deficiency symptoms	Identify the deficiency symptoms of macronutrients and micronutrients in plants	
1. Macronutrients	Define macronutrients Identify the deficiency symptoms of nitrogen, phosphorous, and potassium in plants	Lecture and Handout: Macronutrient deficiency symptoms Ref.: (27):H01-B7-U3-4; (30):150; (42):113-115
2. Micronutrients	Define micronutrients Identify the deficiency symptoms of some micronutrients	Lecture: Micronutrient deficiency symptoms Ref.: (17):187; (27):H01-B7-U3-5 and H01-B7-U3-6; (30):149

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO	SUGGESTED LEARNING ACTIVITIES
B. Fertilizers	Identify and apply organic and inorganic fertilizers	
1. Organic	Define organic fertilizer	Lecture: Organic fertilizers Ref.: (27):HO1-B7-U2-1; (40): Chpt. 5 Demonstration: Fertilizer application Fertilizer calculation Student Activity: Correctly apply organic fertilizers
	Identify types of organic fertilizers	
	List advantages and disadvantages of using organic fertilizers	
	Apply organic fertilizers correctly	
2. Inorganic	Define inorganic fertilizer	Lecture: Inorganic fertilizers Ref.: (27):HO1-B7-U3-1; (40): Chpt. 5 Demonstration: Fertilizer application Fertilizer calculation Student Activity: Correctly apply inorganic fertilizers
	Identify types of inorganic fertilizers	
	List advantages and disadvantages of using organic fertilizers	
	Apply inorganic fertilizers correctly	
C. Soil Testing	Obtain representative soil samples	
	Test for soil pH	
	Send a soil sample away for testing	
1. Soil sampling	Obtain a representative sample	Lecture: Obtaining a representative sample Soil Testing Ref.: (27):HO1-B7-U4-TM1 and HO1-B7 U4-TM2 Demonstration: Obtain a representative sample Student Activity: Obtain a representative sample

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Soil pH	Determine soil pH using a soil testing kit Identify effects of soil pH on fertilizer availability	Lecture: Soil pH Ref.: (27):Blk. VI
3. Soil analysis service	Send in a soil sample to be tested	Guest speaker: Extension agent discussing the service Student Activity: As a class, send in a soil sample for analysis
D. Computation of fertilizer requirements	Compute and apply the correct amount of fertilizer	
1. Calibration	Apply the proper amount of fertilizer for a given land area	Lecture: Fertilizer calibration Ref.: (27):HOI-B7-U4-9 Demonstration: Use of soil analysis and recommendations to determine needs for a given area Student Activity: Apply the proper amount of fertilizer to a given land area
2. Calculating fertilizer needs	Determine the amount of fertilizer needed in a given area	Lecture: Fertilizer calculation Ref.: (27):HOI-B7-U4-1 Demonstration: Test plants using various amounts of fertilizer Bring in samples of plants with nutrien deficiencies

Unit: IV Pest Control

Major Objective: The student will be able to identify and control pests of economic crops

Major Concept: The knowledge of causal agents and their control optimizes crop yields

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Pesticides	Define, identify, and use pesticides correctly	
1. Classification	Define pesticides Identify classes of pesticides	Lecture: Classes of pesticides Ref.: (40): Chpt. 6 Field Trip: Visit farmers to observe pesticide application
2. Methods of Control	Demonstrate the proper methods of pesticide application	Lecture: Application of pesticides Ref.: (11); (17):267-274; (40): Chpt. 6 Demonstration: Proper methods of pesticide application Student Activity: Apply pesticides correctly

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Safety	Demonstrate safety procedures in applying pesticides	Lecture and Handout: Safety: Ref.: (11); (40): Chpt. 6 Demonstration: Pesticide safety Use of the label as the law Student Activity: Apply pesticides safely
B. Insects	Classify insects as beneficial or harmful to economic crops Identify methods of insect control	
1. Classification	Identify beneficial and harmful insects	Lecture: Beneficial and harmful insects Ref.: (11):5-14; (40):Chpt. 6 Student Activity: Collect and identify insects
2. Methods of insect control	List methods of insect control Select the proper insecticide Apply insecticides correctly	Lecture: Insect control Ref.: (11):4; (17):284-286; (40): Chpt. 6 Demonstration: Application of insecticides Student Activity: Select, formulate, and apply insecticides under teacher supervision

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
C. Diseases	Identify plant diseases List methods of controlling plant diseases	
1. Causal agents	Define causal agents Given examples of diseases caused by virus, fungi, bacteria, and nematodes	Lecture: Plant Disease Causal Agents Ref.: (17):269-275; (40): Chpt. 6 Demonstration: Samples of plant diseases
2. Methods of Control	List methods of disease control Demonstrate methods of disease control	Lecture: Plant Disease Control Ref.: (28):B1-U1-3; (40): Chpt 6 Demonstration: Methods of disease control
D. Weeds	Define, classify, and list problems caused by weeds	
1. Classification of weeds	Define the term weed Classify a weed as an annual, biennial, or perennial	Lecture: Weed Classification Ref.: (17):29-31; (40):Chpt. 6 Student Activity: Collect weed samples
2. Methods of Control	List and describe methods of weed control	Lecture: Methods of Weed Control Ref.: (28):B1-U5-1; (40): Chpt. 6

Unit: V Field Preparation

Major Objective: The student will be able to prepare the field for optimum productivity by proper cultivation, crop rotation, and irrigation practices

Major Concept: Good field preparation leads to optimum productivity of economic crops

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Cultivation	Identify land clearing techniques and field cultural practices	
1. Land Clearing	Identify and apply land clearing techniques	Lecture: Techniques of land clearing Ref.: (40): Chpt 3 Demonstration: Tools, chemical, physical techniques, and fire Student Activity: Clear land for a garden
2. Terracing	Identify different terracing methods Make terrace models Make simple layouts of terrace positions on the land	Lecture and Handout: Terracing techniques and erosion control Ref. (40): Chpt 3 Field Trip: Any terraces in the area Demonstration: Layout of terraces and terrace construction

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
		Student Activity: Plot out terrace positions in the field
3. Land Preparation	Describe the importance of soil preparation List equipment used in soil preparation Make a simple seed bed	Lecture and Handout: Soil preparation Ref. (40):Chpt 3 Demonstration: Examples of tools Types of seed beds Student Activity: Construct a seed bed
B. Crop Rotation	Select and sequence plants for crop rotation Divide land for crop rotation	
1. Crop Selection	Select and sequence plants for crop rotation	Lecture and Handout: Importance of crop rotation Rotation sequences Handout on possible crops grown in Micronesia Ref.: (40): Chpt 8 Field Trip: Visit experiment station with an extension agent Visit farms to identify crops grown in sequence Student Activity: Formulate crop rotation plan

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Land Division	Make a plot plan of the school farm Divide and classify the school farm land according to best use	Lecture and Handout: Agricultural engineer speaking on the importance of crop rotation and land division Demonstration: Diagramming to scale Samples of plot plans Student Activity: Make a plot plan
C. Irrigation	Identify different irrigation practices and drainage systems	
1. Methods of Irrigation	Identify different types of irrigation methods Construct an irrigation system	Lecture and Handout: Irrigation techniques Ref.: (40):Chpt. 5 Demonstration: Construct an irrigation system Field Trip: Types of irrigation systems in use Student Activity: Construct an irrigation system
2. Drainage	Identify different drainage systems Lay out a simple drainage system Construct a model of a drainage system	Lecture and Handout: Drainage systems Problems caused by excess water Ref.: (40):Chapts. 3 and 5 Demonstration: Layout design Student Activity: Construction of a model

Unit: VI Horticultural Mechanics

Major Objective: The student will be able to maintain and utilize equipment properly

Major Concept: Knowledge of horticultural mechanics increases efficiency and productivity

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Identification of Farm Equipment	Classify equipment according to use Identify hand and power tools Identify equipment	
1. Tractor	Identify specific functions of a tractor Maintain a tractor Operate a tractor	Lecture and Handout: Tractors - guest speaker equip. operator Ref.: (34):393-559 Demonstration: Tractor operation Tractor maintenance Student Activity: Operate a tractor Service a tractor

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Tillers	Identify different models of tillers Identify tiller parts Operate and maintain a tiller	Lecture: Tiller use, operation, and maintenance by guest speaker - equipment operator Ref.: (34):393-556 Demonstration: Tiller Operation Tiller Maintenance Student Activity: Operate a tiller Service a tiller
3. Lawn mower	Operate a lawn mower Maintain a lawn mower	Lecture: Lawnmower use, operation, and maintenance Ref.: (34):393-556 Demonstration: Correct operation of a lawnmower Maintenance of a lawnmower Student Activity: Operate a lawn mower Maintain a lawn mower
4. Power tools	Identify power tools Operate power tools Maintain power tools	Lecture and Handout: Power tools use, operation, and maintenance. Illustrated handouts of tools Ref.: (34):393-556 Demonstration: Observe tools being used by guest demonstrator or instructor Student Activity: Operate the power tools Maintain the power tools Order tools and parts

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
B. Safety	Exercise safe handling of tools and equipment	
1. Rules	State rules concerning use of all of the equipment Obey the rules stated	Lecture and Handout: Film on safety Handout rules on safety Student Activity: Read rules Sign statement that they understand rules
2. Handling	Safe handling of tools	Demonstration: Safe use of all tools Student Activity: Use the tools properly and safely

Unit: VII Farm Management

Major Objective: The student will be able to develop plans for some farm operations and keep simple records

Major Concept: Knowledge of good farm management practices optimizes profits

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Basic Planning	Prepare plans for a farm	
1. Goal Setting	Write enterprise goals Write personal goals	Lecture: Goal setting Ref.: (33):FBMI-7 Guest Speakers: Speakers from Planning and Budget Student Activity: Practice writing simple goals
2. Scheduling	Prioritize work activities Formulate farm operations schedule	Lecture: Scheduling Ref.: (4) Classroom Arrangement: Posting daily classroom schedule Organize equipment and materials for daily use

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
		Student Activity: Forumlate a schedule to be used in the field or garden Follow the formulated schedule
B. Record Keeping	Keep simple records	
1. Crop Records	Keep accurate records of crops	Lecture: Keeping crop records Ref.: (34):FBMI-105 Demonstration: Filling out record forms made by the instructor Student Activity: Fill in record forms
2. Cash Records	Journalize and prepare simple financial statements Record cash in and cash out Make a simple balance sheet	Lecture: Accounting Techniques Ref.: any accounting text Guest Speaker: Accountant Student Activity: Research techniques of record keeping Prepare simple statements

COURSE TITLE:

HORTICULTURE III

COURSE DESCRIPTION:

Horticulture III is a vocational course with an emphasis on the practical application of horticultural theories and practices learned in Horticulture I and II. Farm management is emphasized. The laboratory and field experiences include the areas of vegetable crops, fruit crops, and ornamental horticulture. Record keeping is required of all students.

COURSE GOAL:

The goal of Horticulture III is to give the student a realistic view of the work of a horticulturist. Horticulture III will enable the student to have a smooth transition from an academic setting to a live situation.

COURSE OBJECTIVES:

After completing this course, the student will be able to:

1. Keep accurate records of farm activities, plan a farm layout, select profitable enterprises, formulate planting schedules, and establish short, intermediate, and long range goals and objectives,
2. Cultivate and market crops profitably,
3. Construct and maintain farm facilities,
4. Maintain and operate equipment efficiently and safely, and
5. Make a wise career choice.

COURSE OUTLINE:

UNIT I - Farm Business Management

A. Planning

1. Farm Layout
2. Selection of Enterprises
3. Planting Schedule
4. Short Range Goals and Objectives
5. Intermediate Range Goals and Objectives
6. Long Range Goals and Objectives
7. Budget

B. Record Keeping

1. Daily Log
2. Cash Receipts and Expenses
3. Inventory

UNIT II - Crop Management

A. Vegetable Crops

1. Vegetable Crop Industry
2. Cultivars
3. Land Preparation
4. Sexual Propagation
5. Asexual Propagation
6. Cultural Practices
7. Marketing

B. Fruit Crops

1. Fruit Crop Industry
2. Land Preparation
3. Methods of Propagation
4. Cultural Practices
5. Marketing

C. Ornamentals

1. Ornamentals Industry
2. Plant Identification
3. Nursery Layout
4. Potting Soils
5. Propagation Practices
6. Cultural Practices

UNIT III - Farm Facilities Management

A. Farm Fences

1. Fence Planning
2. Fence Installation
3. Fence Pole Replacement
4. Fence Maintenance

B. Construction

1. Planning
2. Building construction

C. Nursery

1. Building a Flat
2. Building Benches

UNIT IV - Equipment Management

A. Tiller

1. Identification of Parts
2. Operation
3. Maintenance
4. Safety

B. Tractor and Implements

1. Identification of Parts
2. Operation
3. Maintenance
4. Safety

UNIT V - Job Opportunities (Career)

A. Horticulturally Related Jobs

1. Government
2. Private Sector

B. Applying for a Job

1. Sources of Information
2. Resume
3. Filling in an Application Form
4. Writing a Follow-up Letter

C. Self-Employment

1. Legal Aspects
2. Loan Agencies

Unit: I Farm Business Management

Major Objective: The student will be able to keep accurate records of farm activities, plan a farm layout, select profitable enterprises, formulate planting schedules, and establish short, intermediate, and long range goals and objectives for himself

Major Concept: Good planning and accurate records provide the means for improvement, expansion, and the application of new techniques

SUB-UNIT	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Planning	Formulate a functional farm business plan	
1. Farm Layout	Sketch a farm layout List the benefits of a good farm layout	Lecture and Handouts: Discussion on field arrangement Ref.: (26):151-161 Field Trip: Local farms Student Activity: Prepare a farm layout Ref.: (16):21-43
2. Selection of Enterprises	Identify the different horticultural enterprises in the area Select the best enterprise	Lecture and Handouts: Horticulture Production Enterprises Ref.: (19):89-123 Student Activities: List horticultural enterprises in the area Select an enterprise

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Planting Schedule	Identify seasonal and non-seasonal crops Formulate a functional planting schedule	Lecture and Handouts: Discussion on handouts or planting the field Ref.:(19):154-162; (40): Chapt. 8 Student Activity: Develop a planting schedule
4. Short Range Goals and Objectives	List advantages of goal setting Determine short range goals and objectives Develop the ways and means of achieving the goals	Lecture and Handouts: Discuss handouts on the advantages of goal setting Define short range goals Ref.: (33):7-8 Student Activity: Develop short range goals and ways and means of achieving them
5. Intermediate Range Goals and Objectives	Determine intermediate range goals and objectives Develop the ways and means of achieving the goals	Lecture and Handout: Discuss the intermediate range goals Ref.: (33):7-8; Student Activity: Determine individual intermediate range goals and ways and means of achieving them
6. Long Range Goals and Objectives	Determine long range goals and objectives Develop ways and means for achieving the goals	Lecture and Handout: Discussion on the importance of long range goal setting Ref.: (33):7-8 Student Activity: Determine individual long range goals and the ways and means of achieving them

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
7. Budget	Develop a budget	Lecture and Handouts: Discuss handouts on budgeting Look at sample budgets Student Activity: Develop a budget
B. Record Keeping	Recognize the different record keeping forms and correctly make entries	
1. Daily log	Make correct entries in the daily log Record daily activities in a general journal form Identify types of production records	Lecture and Handouts: Discuss the different farm activities that must be recorded Demonstration: Demonstrate techniques of making an entry Ref.: (19):653-660 Student Activity: Make a daily log
2. Cash Receipts and Expenses	Distinguish between cash receipts and cash expenses Correctly record all cash receipts and expenses	Discussion and Handouts: Discuss handouts on cash receipts and expense forms Ref.: (19):653-660; (33):35-41, 153-173 Demonstration: Techniques of making an entry Sample transactions Student Activity: Recording cash receipts and expenses, Posting entries

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Inventory	List purposes and benefits of keeping inventory records Discuss methods of valuation for farm inventories Take inventory by making a physical count	Lecture and Handouts: Discuss handouts on inventory records Ref.: (33):43-64 Student Activities: Take an inventory of school agriculture facilities Determine present values of tools, facilities, and equipment

Unit: II Crop Management

Major Objective: The student will be able to cultivate and market crops profitably

Major Concept: Best economic returns result from high yields and quality crops which are properly managed

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Vegetable Crops	Cultivate and market vegetable crops profitably	
1. Vegetable Crop Industry	Define Olericulture List potential economic vegetable crops	Lecture and Handouts: Vegetables Ref.: (41):44-48 Student Activity: List locally grown vegetable crops
2. Cultivars	Define Cultivar Differentiate between hybrid and non-hybrid List cultivars of various vegetable crops which are common to the area	Lecture and Handouts: Discussion on cultivars, hybrids, and common vegetable crops in the area Ref.: (40):11-13 Demonstration: Identify vegetable crops and cultivars in the school garden

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Land Preparation	List methods of land preparation Prepare the land according to steps and methods given	Lecture and Handouts: Field preparation Ref.: (40):26-31 Demonstration: Selection of tools and their use in land preparation Student Activity: Prepare a field for planting
4. Sexual Propagation	Select cultivars for planting Propagate seeds by direct field planting Propagate seedling for transplanting Transplant seedlings in the field	Demonstration: Methods of sexual propagation Ref.: (27):Blk III, Unit 3 and 4; (40):41 Student Activities: Seeding in flats Direct seeding in the field Transplanting seedlings
5. Asexual Propagation	List vegetable crops that are propagated asexually Propagate vegetable crops asexually	Lecture and Handouts: Methods of asexual propagation Ref.: (27):Blk IV, Unit 2 and 4; (40):41-43 Student Activities: Propagate vegetable crops by cuttings Propagate vegetable crops by separation

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
6. Cultural Practices	Fertilize crops at the proper stage Protect crops	Lecture and Handouts: Cultural Practices Ref.: (40):159-196 Demonstration: Fertilizing, spraying, and weeding techniques Student Activity: Fertilize, spray, and weed under supervision
7. Marketing	Locate outlets for crops before planting Harvest crops at the proper stage Prepare crops for market	Lecture: Government official to speak on marketing Demonstration: Harvesting of crops Grading of crops(U.S.) Student Activity: Harvesting, grading, and packing of various crops Contact potential customers
B. Fruit Crops	Cultivate and market fruit crops profitably	
1. Fruit crop industry	Define the term pomology List potential commercial fruit crops List factors that influence local fruit production	Lecture: Fruit crop industry; factors that influence production Ref.: (36) Field Trip: Orchards

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Land Preparation	List three steps in the tillage operation Till the land in preparation for planting	Lecture: Land Preparation Ref.: (36) Demonstration: Tilling techniques Student Activity: Till a field under teacher supervision
3. Methods of Propagation	Select the proper propagation method to use in the orchard	Lecture and Handout: Discussion on propagation methods used in orchards Ref.: (36) Demonstration: Asexual methods of propagation - cuttings, budding, and grafting Direct seeding in the field Student Activity: Grafting and/or budding, making of cuttings, and direct seeding of papayas in the field
4. Cultural Practices	Apply approved cultural practices in fruit crop production	Lecture: Discussion on cultural practices in fruit crop production Ref.: (36) Student Activity: Field work on application of each practice

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
5. Marketing	Locate marketing outlets for crops List methods of harvesting Prepare produce for market	Lecture: Importance of marketing outlets and proper harvesting techniques Ref.: (36) Student Activity: Visit local markets Sell products in the local market
C. Ornamentals	Cultivate and market ornamental crops profitably	
1. Ornamentals Industry	Define ornamentals List the uses of ornamental plants	Lecture: Orient students to the field of ornamentals Ref.: (43):215-220
2. Plant Identification	Identify and list common ornamental crops	Lecture-Demonstration: Supervise identification of ornamental crops in the field Field Trip: Hotels
3. Nursery Layout	Draw a plan for a nursery Construct a small greenhouse	Lecture-Handout: Class discussion on plans Demonstration: Drawing of plans Ref.: (40): Chpt. 15 Student Activity: Draw plans and construct a small greenhouse

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
4. Potting Soils	Identify good soil and other potting medium for growing plants Construct seed boxes or obtain planting containers	Demonstration: Types of potting mixes Ref.: (40): Chpt. 15
5. Propagation Practices	Germinate ornamental seeds Transplant seedling into pots Increase plants by cuttings	Lecture: Review of plant propagation techniques Ref.: (10) Student Activity: Germinate seeds Transplant seedlings Propagate plants by cuttings
6. Cultural Practices	Identify common fertilizers Apply fertilizers to enhance plant growth Identify common pesticides	Lecture: Types of fertilizers and pesticides commonly used in the area Ref.: (40): Chpt. 15 Demonstration: Types and kinds of fertilizers Commonly used pesticides Application of fertilizers Student Activity: Apply fertilizers

Unit: III Farm Facilities Management

Major Objective: The student will be able to construct and maintain farm facilities

Major Concept: Well maintained and managed facilities reduce replacement expenses and provide maximum use of facilities

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Farm Fencing	Construct and maintain a farm fence	
1. Fence Planning	Prepare a diagram or layout of the area to be fenced in	Lecture and Handout: Discuss handout on predesigned fencing layout of the school layout Ref.: (34):689-690
2. Fence Installation	Select the type of fence posts best adapted for the kind of fence being constructed Install a fence	Lecture and Handout: Methods of fence installation Ref.: (34):696-703 Student Activity: Survey school farm Install a fence as planned

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Fence Maintenance	Distinguish between sound and rotten poles Select poles that are best suited for the fencing purpose Formulate a workable fence cleaning schedule Clean a fence	Lecture-Handouts: Determination of good posts Importance of a clean fence Ref.: (34): 696-703 Student Activity: Identify fence posts that should be replaced Formulate a cleaning schedule Clean a farm fence
B. Construction	Define construction terms Construct an economical shelter	
1. Planning	Decide on the type of building needed Decide on the kind of materials to use Estimate the quantity of materials needed to complete a job	Lecture and Handouts: Review and discuss handouts on building designs Discuss handouts on making estimates Ref.: (34):568-595 Student Activity: Practice making a design or sketch Practice making estimates
2. Building Construction	Demonstrate skills in the proper use and handling of a square Construct batter board correctly Demonstrate skills in leveling	Lecture and Handouts: Handout and discussion on the uses of the square Handout and discussion on leveling Handout and discussion on framing techniques Handout and discussion on roofing

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
	Demonstrate skills in framing Demonstrate skills in roofing	Ref.: (3): 373-399; (34): 89 Student Activity: Develop and improve skills in squaring, leveling, framing, and roofing Construct a small shelter
C. Nursery	Construct nursery accessories	
1. Building a flat	Select the type of materials that are best suited for a flat Construct a flat	Lecture and Handout: Discuss handouts on flat designs including uses of the flat and materials that are used in flat construction Ref.: (40):Chpt. 15 Student Activity: Select a flat design and the necessary materials Construct a flat
2. Building nursery benches	Select a bench design Choose materials that are best suited for a bench Build a bench	Lecture and Handout: Discuss handouts on bench designs including materials that are used in bench construction Ref.: (40): Chpt. 15 Student Activity: Select a bench design and the necessary materials for its construction Build a bench

Unit: IV Equipment Management

Major Objective: The student will be able to maintain and operate equipment efficiently and safely

Major Concept: Efficiency in farm operations depend on well-maintained equipment

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Tiller	Correctly operate and maintain a tiller	
1. Identification of Parts	Identify all major parts of a tiller	Lecture and Handouts: Discuss handouts on parts of a tiller Ref.: owner's manual Demonstration: Physical identification of parts Student Activity: Identify all of the major parts of a tiller
2. Operation	Operate a tiller correctly	Demonstration: Demonstrate the correct use of a tiller Student Activity: Correctly operate a tiller under supervision

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Maintenance	Correctly lubricate a tiller Correctly adjust a tiller	Demonstration: Demonstration on maintenance and service operations Student Activity: Clean and service a tiller under supervision
4. Safety	Follow safety procedures at all times	Lecture and Handout: Discussion on handouts on safety provided by instructor Student Activity: Read safety handouts Sign statement on safety
B. Tractor and Implements	Correctly maintain and operate a tractor and implements	
1. Identification of parts	Identify major parts of a tractor Identify implements	Lecture and Handouts: Discuss handouts of a cutaway view of a tractor and diagrams of moldboard and disc plows, disc harrows, rotary tillers, cultivators, and spring-tooth harrows Ref.: (2):9; owner's manual Student Activity: Identification of tractor parts and implements
2. Operation	Correctly operate the tractor with implements	Demonstration: Demonstration of major tractor operations Student Activity: Operate a tractor under supervision

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
3. Maintenance	Check the tractor for air, water, and oil before operating Service the tractor	Demonstration: Maintenance and service Ref.: (2):61-187; owner's manual Student Activity: Check and service a tractor under supervision
4. Safety	Follow safety procedures at all times	Lecture and Handouts: Discussion of handouts on safety procedures Ref.: (34):23-48 Student Activity: Read handout on safety Sign statement of understanding

Unit: V. Job Opportunities

Major Objective: The student will be able to make a wise career choice

Major Concept: Knowledge about job and self-employment opportunities will allow the student to make a wise career choice

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
A. Horticulturally related jobs	Identify the different jobs requiring a background in horticulture	
1. Government	Identify various government jobs related to horticulture	Lecture and Handouts: Guest speaker - government horticulturist Discussion to review information gained from the guest speaker Ref.: (19):92-96 Student Activity: Identify government jobs into which a horticulturist may enter

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
2. Private Sector	Identify jobs related to or requiring knowledge about horticulture	Lecture: Local farmer or merchant Student Activity: Identify other possible jobs related to horticulture in addition to those given by the guest speaker
B. Applying for a Job	Apply for a good job by searching out job openings, write a resume and follow-up letter, and fill out an application form	
1. Sources of Information	Name three major sources of job opening leads	Lecture and Handouts: Discussion on handouts Ref.: (28):H01-B8-U1-1-20
2. Resume	Prepare a resume	Lecture and Handout: Discuss handouts on resumes and sample resumes Ref.: (28):H01-B8-U1-1-20 Student Activity: Practice writing a resume
3. Filling in an application form	Fill out an application form	Demonstration: Government and private sector job application forms Student Activity: Fill out a job application form

SUB-UNITS	PERFORMANCE OBJECTIVES (THE STUDENT WILL BE ABLE TO)	SUGGESTED LEARNING ACTIVITIES
4. Writing a follow-up letter	Write a follow-up letter	Lecture and Handout: Discuss samples of follow-up letters Ref.: (28):H01-B8-VI-1-20 Student Activity: Practice writing a follow-up letter
C. Self-employment	Identify legal and financial aspects of self-employment	
1. Legal aspects	Obtain a business license	Lecture and Handouts: Discuss samples of business licenses and application forms Guest speaker -representative from the Labor or Legal Department- with discussion to follow Student Activity: Fill out a business license application form
2. Loan Agencies	Identify the different agencies offering agricultural loans Fill out an application for a loan	Lecture and Handout: Discuss application form samples Guest speaker - banker - with discussion to follow Student Activity: Fill out a loan application form

APPENDICES

LESSON PLAN

HORTICULTURE I

UNIT I - Orientation

Major Objective: After completion of this unit, the student will be able to make a wise career choice. This objective will be considered achieved upon attainment of a score of 75% or better on the unit test.

Specific Objectives:

1. Identify terms in agriculture and horticulture
2. Define the following terms:
   Agriculture
   Commercial Agriculture
   Subsistence Agriculture
   Horticulture
3. List types of plants classified as:
   Vegetables
   Fruits
   Ornamentals
4. State the goals of the horticulture program
5. List the units in the horticulture program
6. List the requirements of the horticulture program
7. Obey the school policies

Information:

A. Define Agriculture (Teacher)
B. Define Horticulture (Teacher) See attachment
C. Review T-M and discuss
D. Handout on horticulture policies See attachment
E. Demonstration with blank paper, lemon fruits, hibiscus flower, and chicken. Discuss the importance of each
F. Handout on Vocational Education

Assignment: (Students)

A. Read Tropical Horticulture for Secondary Schools, Book I, pages 1-7, by Edward Soucie.
B. Plant vegetable crops in the school garden

TEST: (MATCHING) Part I

1. Agriculture - Study of plants and animals
2. Olericulture - Fruit crop production and marketing
3. Pomology - Vegetable crops productions and marketing
4. Floriculture - Study how to produce (crops) plants & animals
5. Biology - Fruits, nut, ornamentals, vegetable, crops

Answering Questions Part II

1. List two goals of horticulture program

   1. _____ 2. _____

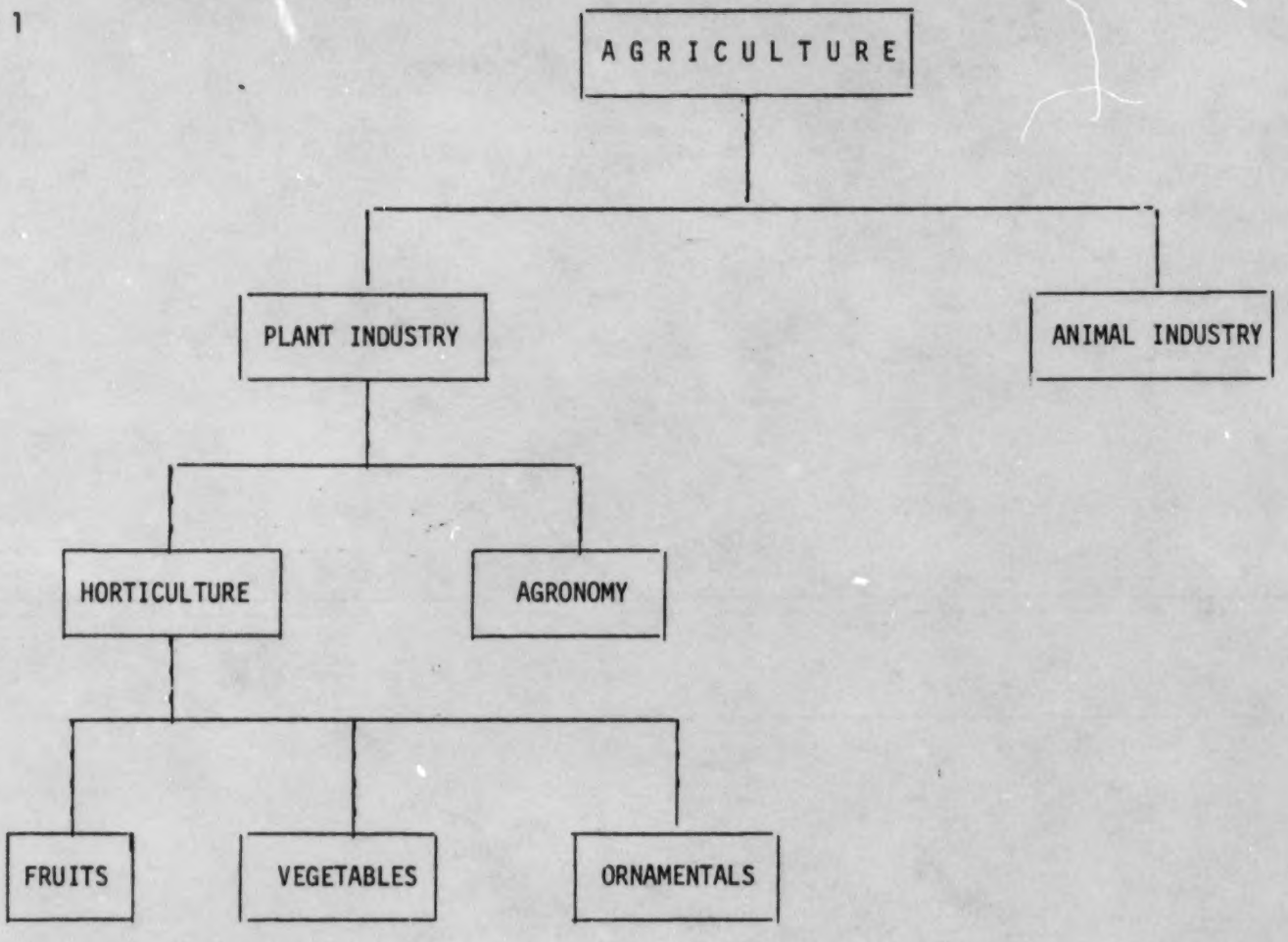
2. Write 10 horticulture policies

3. Give examples of vegetables, fruit, and ornamental crops

4. Write the advantages of commerical agriculture

5. Describe the difference between commercial and subsistance agriculture

T-M 1


AGRICULTURE
PLANT INDUSTRY
ANIMAL INDUSTRY
HORTICULTURE
AGRONOMY
FRUITS
VEGETABLES
ORNAMENTALS

75

ORIENTATION

HANDOUTS

Horticulture Policies

1. All of the students should respect one another.
2. Students should obey school regulations
3. Horticulture students should take care of the plants whenever they are assigned
4. No smoking during work and class hours
5. You are allow to have 6 days excused absences each semester
6. All of the horticulture students should wear safety shoes in the field.
7. Long hair is absolutely prohibited
8. Respect school properties
9. Check instructions before using any pesticides, if you are not sure about the instructions, check with your immediate supervisor or your teacher.

AGRICULTURE

Survival Skills in Horticulture

1. Interest
2. Correct Attitude
3. Proper Skills
   a. I.D. healthy plants
   b. Plants-timing, cultivars, nutritional value, etc.
   c. Soils
   d. Entomology
   e. Plant pathology
   f. Weed control
   g. Harvesting-curing
   h. Spacing
   i. Marketing-grading
   j. Propagation
   k. Irrigation
   l. Thinning
   m. Land preparation
   n. Pruning
   o. Construction
   p. Botanical Science
   q. Math
   r. Crop rotation
   s. Business Administration
   t. Planning
   u. Transplanting seedlings

VOCATIONAL EDUCATION: PURPOSES, ROLES, RESPONSIBILITIES

The State Directors of Vocational Education have developed the following statement describing what they perceive to be the main purpose of vocational education, the kinds of programs and the roles through which it accomplishes these purposes, and the appropriate federal, state, and local responsibilities and relationships for assuring that an adequate level and quality of vocational education services exist. The Directors believe that such a statement may be useful to vocational educators and persons concerned with vocational education at a time of considerable debate regarding what vocational education is, what populations it should serve, how it relates to other social programs, and how it should be administered.

PURPOSES

Vocational education operates as an integral part of the total educational delivery system to benefit both individuals and society. Its main purposes are to:

- Provide individuals with the skills they need to attain economic freedom.
- Enhance the productivity of local, state, and national economies.

Vocational education serves and is accountable to a wide variety of publics. These publics include: students of all ages and previous educational backgrounds; national, state, and local governments; business and industry--both large and small; labor--organized or unorganized; consumers; persons with special educational needs, such as the disadvantaged, the handicapped, persons with limited English speaking ability, and many others. Unlike many more specialized programs, vocational education has no particular constituency; it is a program for all people.

Since the purpose of groups and individuals served by vocational education are diverse and often compete or conflict with one another, vocational education responds by providing many different kinds of programs in many different settings. Any one of these programs has some,

but not all, of the following purposes:

- o Support and strengthen the relationship of education to work
- o Equip individuals with marketable skills.
- o Foster full employment by providing a trained work force to meet current and future labor market needs.
- o Supply a trained work force which will attract and promote economic and industrial development
- o Furnish individuals with information about the nature of work and work opportunities today and in the future.
- o Provide equitable opportunities for all persons to succeed in programs of education for work.
- o Help people develop and apply decision making skills, particularly regarding work and careers.
- o Assist persons in mastering the basic literacy skills required to meet job specifications.
- o Develop people's organizational leadership skills.
- o Promote and support the values of free enterprise in a democratic society.

NOTE: Taken from Trust Territory Advisory Council for Vocational Education FY 1979 10th Annual Report.

LESSON PLAN

HORTICULTURE II

UNIT II - Plant Propagation

Sub-unit E3 - Grafting and Budding

Major Objectives: After completion of this unit, the student will be able to list limitations of grafting and budding, list factors affecting grafting and budding, identify grafting and budding techniques and propagate plants by grafting and budding. To pass the subject, students must achieve 75% or better of the specific objectives.

Specific Objectives:

1. Match terms pertaining to grafting and budding with their correct definitions.
2. List two limitations of grafting and budding.
3. Name four factors affecting grafting and budding.
4. Identify four types of grafting and budding methods.
5. Identify four types of grafting and budding methods.
6. Propagate plants by grafting and budding

Instructional Materials:

A. Objectives
B. Transparency Masters

1. TM1 - Approach grafting
2. TM2 - Cleft grafting

C. Tools and Materials

1. Grafting knives
2. Budding knives
3. Grafting waxes or plastic bags
4. Tying and wrapping materials

D. Test

Student Activities:

1. Studying handouts (terms, diagrams)
2. Field practices (grafting and budding)
3. Taking the test

Presentation

I. Match terms pertaining to grafting and budding with their correct definitions:

A. Cambium - name of cell responsible for growth of a plant diameter.

B. Cion (sometimes spell scion) - a piece of cut from a plant or tree, twig or shoot use for grafting.

C. Understock - lower part of the graft, the root end.

D. Stockplant - plant from which cuttings are taken.

E. Graftage - union of two separate stems, one having two or more buds.

F. Meristematic - with plant tissue being in the process of formation with cells actively dividing and growing.

G. Phloem - a complex tissue made of cells that transport manufactured compound.

H. Xylem - a complex tissue (wood) made of cells that transport water and essential raw materials in water.

I. Budding - a specially types of grafting using a single bud (scion) inserted into the bark of another variety.

J. Node - the joint on the stem of a plant from which leaves, buds, or other structures grow.

II. List two limitations of grafting and budding

A. Limited to plants which develop a secondary plant body; e.g. conifer and dicot (monocots cannot be grafted very readily).

B. Limited to structures which are closely related botanically; e.g. mango and mangoes.

III. Name four factors affecting grafting and budding

A. Incompatibility

B. Kind of plant

C. Temperature, moisture, and oxygen conditions during and following grafting.

D. Growth activity of the stock plant.

Reference: Hartmann and Kester, pp. 328-331.

IV. Identify two grafting methods and two budding methods:

A. Grafting methods

1. approach
2. cleft

B. Budding methods

1. T-budding
2. Patch budding

V. Propagate plants by grafting and budding:

A. Different methods of budding

1. T-budding
2. Patch
3. Flute
4. Ring budding

B. Different methods of grafting - diameter of both root stock and scion are similar:

1. Tongue, roof or ship grafting
2. Approach grafting

diameter of the stock is great than that of the scion:

3. Cleft grafting
4. Bark grafting
5. Notch grafting
6. Wedge grafting

TEST

1. MATCH

_____ a. Cambium	(1)	A piece of cut from a plant or tree, twig or shoot, used for grafting
_____ b. Xylem	(2)	Union of separate stems, one having two or more buds
_____ c. Phloem	(3)	The joint on the stem of a plant from which leaves, buds, and other structures grow.
_____ d. Understock	(4)	Plant from which cutting are taken.
_____ e. Meristematic	(5)	Name of cell responsible for growth of a plant diameter located immediately under the bark.
_____ f. Scion	(6)	A complex tissue (wood) made of cells that transport water and essential raw materials in the water.
_____ g. Graftage	(7)	A complex tissue made out of cells that transport manufactured compound.
_____ h. Node	(8)	Lower part of the graft, the root end.
_____ i. Stockplant	(9)	With plant tissue being in the process of formation with cells actively dividing and grow.

2. List two limitations of grafting and budding:

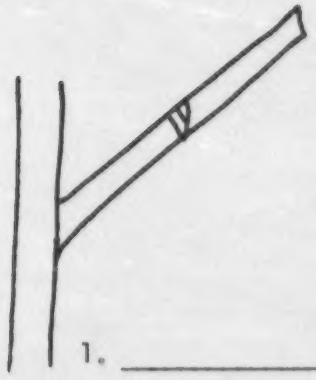
1._____ 2. _____

3. Name 4 factors affecting grafting and budding:

1. _____ 2. _____
3. _____ 4. _____

4. Label the following items:

a. Grafting



1. _____

2. _____

b. Budding

1. _____

2. _____

Job Sheet: GRAFTING

I. Material Needed:

A. Grafting knives and grafting chisel

B. Grafting waxes and plastic bag

C. Tying and wrapping materials

II. Procedure:

A. Collecting stock and scion

B. Cut base of the scion into a thin narrow wedge

C. Make a 20-30 degree cut into the stock 1/2 - 1/3 of the way through the branch

D. The top of stock branch is pulled back and the scion inserted.

E. The scion is angled slightly to give maximum cambial contact.

F. The stock is carefully cut off just above the scion then the union is waxed.

Job Sheet: BUDDING

I. Materials Needed:

A. Budding knives

B. Budding waxes

C. Tying and wrapping materials

II. Procedures:

A. Select the good stock and scion

B. A cut is made at a 45 degree angle about one quarter through the stock.

C. About one inch above the first cut a second is made going downward and inward until it connects with the first cut.

D. The cuts removing the bud from the bud stick are made just as those in the stock. The lower cut is made about 1/4 in. below the bud.

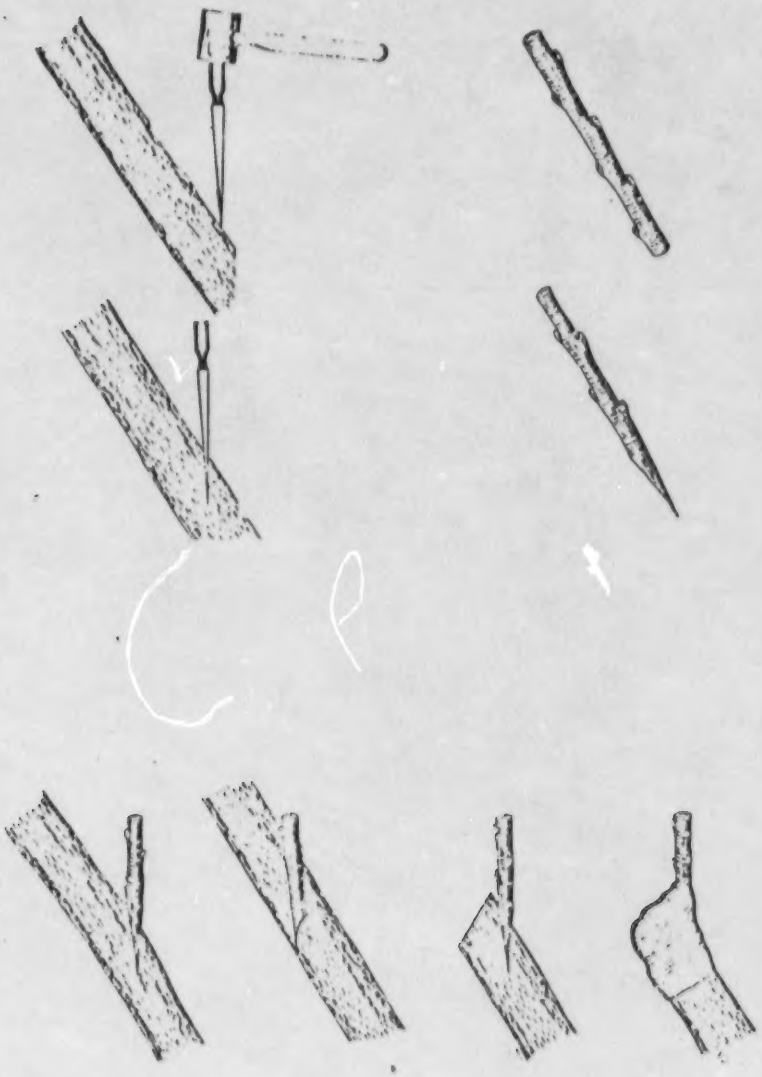
E. A second cut is made about 1/2 in above the bud, coming downward behind the bud and connecting with the first cut, permitting the removal of the bud piece.

F. Carefully place the chip bud on the stock then wrap.

Reference: Hartmann and Kester, pp. 328-438
New Mexico, Horticulture I
1. HO1-B4-U6-4
2. HO1-B-4-U6-TM1
3. HO1-B4-U6-TM2

STEPS IN PREPARING SLIDE OR STUB GRAFTING

STOCK SCION No.1



STEPS IN MAKING THE T-BUD (SHIELDBUD)

STOCK BUD No. 2

Before and often the stock and scion are put together

HANDOUT

GRAFTING & BUDDING TERMS & DEFINITIONS

A. Cambium - name of cell responsible for growth of a plant diameter.

B. Cion (sometime spell scion) - a piece of cut from a plant or tree, twig or shoot use for grafting.

C. Understock - lower part of the graft, the root end

D. Stockplant - plant from which cuttings are taken.

E. Graftage - union of two separate stems, one having two or more buds.

F. Meristematic - with plant tissue being in the process of formation with cells actively dividing and growing.

G. Phloem - a complex tissue made of cells that transport manufactured compound.

H. Xylem - a complex tissue (wood) made of cells that transport water and essential raw materials in water.

I. Budding - a special type of grafting using a single bud (scion) inserted into the bark of another variety.

J. Node - the joint on the stem of a plant from which leaves, buds or other structures grow.

LESSON PLAN

HORTICULTURE III

UNIT II - Crop Management

Sub-unit A - Vegetable Crops

Major Objectives: Upon completion of this unit, the student will be able to cultivate and market vegetable crops profitably. This objectives will be considered achieved upon completion of 75% or more of the specific objectives.

Specific Objectives:

1. Match terms with their correct definitions
2. Identify potential economic vegetable crops
3. Differentiate between hybrid and non-hybrid cultivars
4. List common vegetable crops that are grown locally
5. List methods of land preparation
6. Prepare the land for planting
7. Identify vegetable crops that are asexually propagated
8. Identify vegetable crops that are sexually propagated
9. List methods of fertilizing vegetable crops
10. List methods of protecting vegetable crops
11. Harvest and market vegetable crops properly

INFORMATION SHEET

I. VEGETABLE CROPS

A. Terms and Definitions

1. Olericulture - The production, processing and distribution of vegetable crops.
2. Cultivars - Means cultivated variety
3. Sexual Propagation - Plants grown by use of seed
4. Asexual Propagation- Growing plants by use of a part of the growing plant, or specialized stem

B. Vegetable Crops Industry

1. Overview of the economics and potential of the vegetable crops industry. (Teacher).
2. The potential economic vegetable crops
   a. Head cabbage, chinese cabbage, green-onion, lettuce, tomato, eggplant, bell pepper, okra, beans, peanuts, soybeans, watermelon, cucumber, pumpkins, squash, corn, sweet potato, radish, carrot, cassava, etc.

C. Cultivars

1. Select vegetable crops from the locally suitable cultivars.
2. Differences between hybrid and non-hybrid cultivars.

Non-Hybrid Cultivar	Hybrid Cultivar
"It is true to seed." If cross pollination from other cultivar of the same crop is prevented.	The replanted plants will begin to get variation of the original plant. "It will segregate" and will not be true to seed.

D. Land Preparation

1. Method of Land Preparation

a. Primary Tillage - Is the initial cutting or breaking of soil. This consists mainly of plowing, spading or hoeing.

b. Secondary Tillage-Operation following the primary tillage which consist of breaking the soil if it clods.

c. Minimum/Zero Tillage - Is the final loosening, leveling and tilling of soil which also includes making the beds readied for planting.

E. Sexual Propagation

1. Vegetable crops propagated by seed:

Corn, beans, peanuts, cabbages, cucumber, watermelon, pumpkins, squash, tomato, eggplant, etc.

2. Direct field planting vegetable (See table below).

a. Depth to plant the seeds - Consult chart at the end of this unit.

b. Seeding methods

- Continuous Band - Seeding consecutively in a line i.e. bush beans, corn, etc.

- Hill planting method - seeding in clusters i.e. pole beans, cucumbers, etc.

3. Transplanted Vegetables (See table below)

a. Prepare the seedling for transplanting
b. Prepare the growing bed in the field

c. Decide when to transplant

1. Best time is early in the morning and late in the afternoon.

d. Take the plants from the nursery to the field

e. Set proper spacing in the field (Refer to chart at the end of this unit)

f. Plant the seedling and fertilize

Table I. Method of Propagation

Direct Seeded		Transplanted
corn	okra	head cabbage
beans	green onion	chinese cabbage
cucumber	carrot	green onion
radish	watermelon	lettuce
pumpkins		bell pepper
		eggplants
		tomato

F. Asexual Propagation

1. Vegetable crops that are asexually propagated. green onion, sweet potato, ginger, garlic, etc.

G. Cultural Practices

1. Fertilizing the plant

a. Types of fertilizers to be used: commercial fertilizers, compost, animal manure, sand, green manure, etc.

b. Methods of applying commerical fertilizers

1. Broadcast method - Use in fertilizing crops that are grown close together.

i.e. carrot, radish, corn.

- Evenly applied over the entire surface of the soil
- Applied prior to the minimum/zero tillage.

2. Row Methods

- Fertilizer is placed at the bottom of the furrow before planting
- Fertilizer placed directly below the plants

3. Side and ring placement methods

- Fertilizer is applied in a continous band round or side of the plant

4. Liquid Method of applying fertilizer

- Fertilizer is applied direct to soil
- Fertilizer is applied as a foliage spray
- Fertilizer is applied with irrigation water
- Supply trace element

2. Protecting the crop

a. Weed Control

1. Mechanical Control

Hand weeding
Weeding using hoe, etc.

2. Mulching
3. Minimum spacing of plant
4. Crop Rotation

b. Spray for insects and diseases

1. Spray insecticides and fungicides
2. Sanitation
3. Hand picking
4. Healthy plant

3. Pruning and thinning

H. Harvesting and Marketing

1. Locate the market outlets for the crops

a. Contact the local markets to check the demand of the vegetables to be grown.

2. Time to harvest (Consult table II, time to maturity)

3. Harvesting tools and supplies

   Harvesting container
   Marketing containers
   Pruning scissors
   Pocket knife
   Scales
   Plastic bags

ACTIVITIES

I. Instructor

A. Provide students with objective sheets
B. Provide students with information sheets
C. Discuss major and specific objectives
D. Discuss information sheet
E. Discuss the chart
F. Give unit test

II. Student

A. Read objective
B. Study information sheet
C. Demonstrate ability to follow the chart
D. Take unit test

INSTRUCTIONAL MATERIALS

III. Included in this unit

A. Objectives
B. Information
C. Chart and Table
D. Unit Test
E. Answer to Unit Test

IV. References

Tropical Horticulture for Secondary School, 2nd ed., Edward A Soucie, S.J., 1975

UNIT TEST

Part I MATCHING

A. Terms

_____1. Cultivar	A.	Plant grown from seeds
_____2. Olericulture	B.	Cultivated variety
_____3. Sexual Propagation	C.	Growing plants by use of a plant of the growing plant or specialized stem.
_____4. Asexual Propagation	D.	The production, processing and distribution of vegetable crops.

Part II ANSWER QUESTIONS

B. Name 5 potential economic vegetable crops:

1._____ 2._____ 3._____

4._____ 5._____

C. Differentiate between hybrid and non-hybrid cultivar

_____

_____

D. List 5 common vegetable crops which are used locally.

1._____ 2._____ 3._____

4._____ 5._____

E. List the three methods of land preparation

1._____ 2._____

3._____

F. Name five crops that are sexually propagated.

1._____ 2._____

3._____ 4._____

5._____

G. List three vegetable crops that are asexually propagated.

1. _____

2. _____

3. _____

H. List three methods of applying commerical fertilizer.

1. _____

2. _____

3. _____

I. List two methods of weeding

1. _____

2. _____

J. List three common tools used in harvesting.

1. _____

2. _____

3. _____

LESSON PLAN

HORTICULTURE III

UNIT III - Farm Facilities Management

Sub-unit A2 - Fence Installation

Major Objectives: Upon completion of this unit, the student will be able to construct and maintain farm fences. This objectives will be considered achieved upon completion of 75% or more of the specific objectives.

Specific Objectives:

1. Install a fence
2. List five types of fences
3. List three types of fence posts
4. Select the most economical type of fence
5. Apply safety rules when using oil preservative

INFORMATION SHEET

A. Types of fences

1. electric
2. woven wire
3. "live"
4. barbed wire
5. board

B. Types of fence posts

1. Metal
2. Wooden
3. Concrete

C. Treatment of Wooden Posts

1. Posts are treated to retard decay
2. Posts with an oil preservative need to be peeled

D. Types of Preservatives

1. Oil soluble preservative
2. Water soluble preservative

E. Safety Precautions

1. Keep fire away from the site because the oil soluble preservative is flammable
2. Wash skin with soap and water where it is touched by the solution being used

F. Installing Fence Posts

1. Select the straightest poles
2. Space posts 12 feet apart and set 2.5 feet into the ground
3. End and corner posts are braced properly
4. All the posts should be aligned with the same distance apart whether the fence is straight or on the contour

G. Installing wire

1. Unroll enough wire to fasten it to a corner post
2. The bottom wire should be kept close to the post
3. The use of a wire stretcher is essential in the installation of wooden posts

Reference: Farm Mechanics Test and Handbook
by: Phipps, McColly, Scranton & Cook 2nd ed., 1967, pp. 696-703

SCORE:_____ TEST NAME:_____
TEST NO._____ DATE:_____

I. FILL IN THE BLANK

A. List five types of fences:

1. _____ 4. _____
2. _____ 5. _____
3. _____

B. List three types of fence posts:

1. _____
2. _____
3. _____

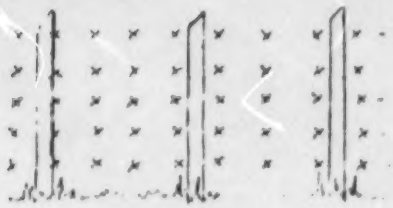
C. List two types of preservatives:

1. _____ 2. _____

D. Identify eight kinds of bracing:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

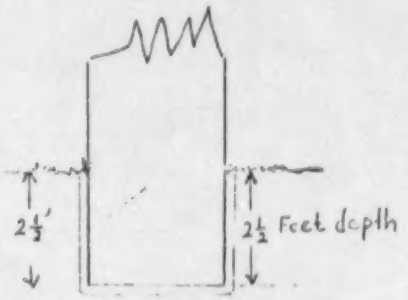
FENCING FOR FLAT LAND



BARBED WIRE

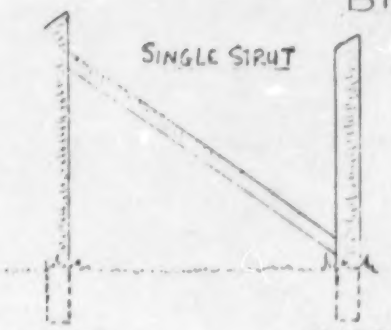
WOVEN WIRE

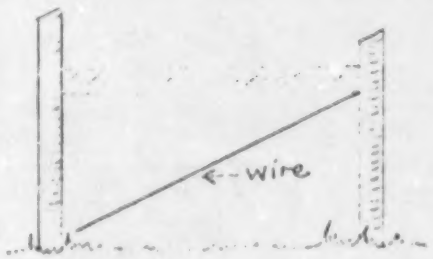
DISTANCE



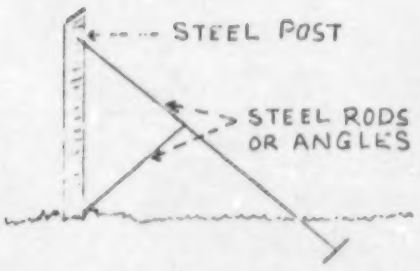
DEPTH

BRACING



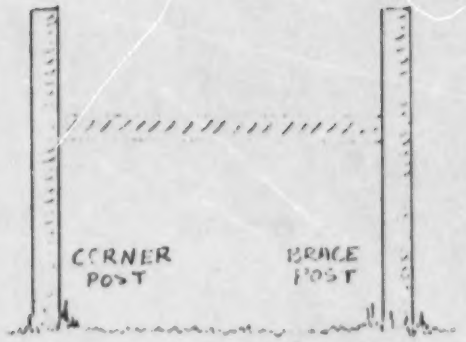


BRACING A CORNER POST WITH A HORIZONTAL STRUT AND A TIE.

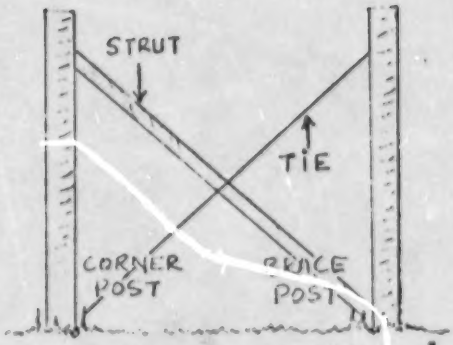


BRACING A STEEL POST

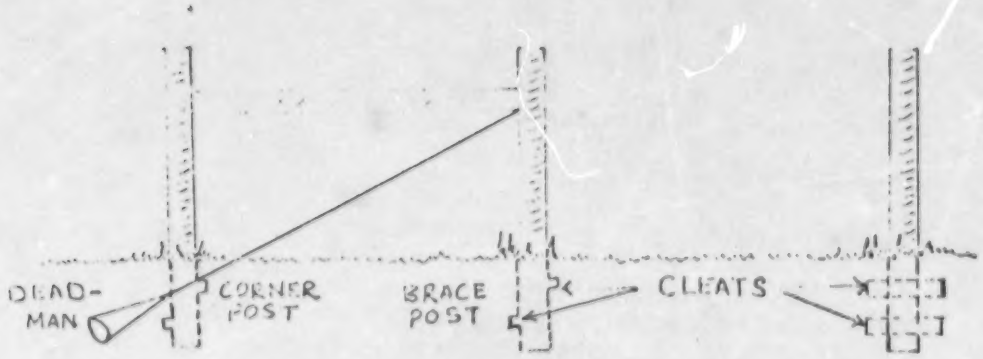
BRACING A CORNER POST WITH A HORIZONTAL STRUT AND WITH CROSSED TIES



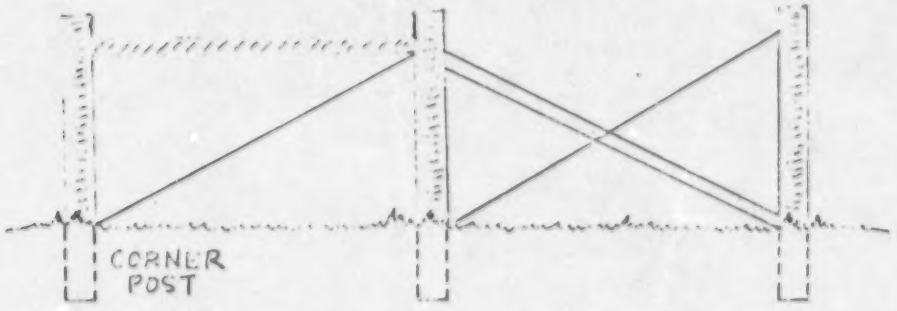
BRACING A CORNER POST WITH A SINGLE HORIZONTAL STRUT



BRACING A CORNER POST WITH CROSSED STRUT AND TIE, AND WITH CLEATS.



BRACING A CORNER POST WITH A STRUT, A DEAD MAN, AND CLEATS ON THE BRACE AND CORNER POSTS.



BRACING A CORNER POST USING TWO BRACE POSTS

LESSON PLAN

HORTICULTURE III

UNIT V - Job Opportunities (Career)

Major Objectives: Upon completion of this unit, the student will be able to make a wise career choice. This objective will be considered achieved upon attaining a score of 75% or better on the unit test.

Specific Objectives:

1. Match horticulturally related government job titles with job descriptions.
2. Write five horticulturally related private job titles.
3. Write five horticulturally related private job descriptions.

Instructional Activities:

A. Government Horticulturist

B. Local farmer or merchant

Student Activities:

A. Study information given by the instructor
B. Take notes on the two guest speakers' speeches
C. Identify horticultural jobs both in the government and private sectors
D. Take unit test

Reference:

Krebs, Alfred H. Agriculture in Our Lives. Illinois: Interstate Printers and Publishers, Inc., 1979.

INFORMATION SHEET
(HANDOUT)

I. Horticulturally Related Jobs

A. Horticultural Jobs in the Government

1. Chief of Plant Industry Station is responsible for the overall operation of the Station.

2. Horticulturist supervises the daily operation of the nursery and experimental plots and assists the Chief of Plant Industry Station.

3. Assistant Horticulturist assists the Horticulturists and experiments with new cultivars.

4. Entomologist identifies insect pests, formulates control measures, formulates quarantine regulations, and conducts field inspections.

5. Assistant Entomologist assists the Entomologists and conducts periodic visits to local farms.

6. Plant Pathologist identifies disease causing organisms, formulates control measures, formulates quarantine regulations, and conducts field inspections.

7. Assistant Plant Pathologist assists the Plant Pathologist and conducts periodic visits to local farms.

8. Nursery or Greenhouse Operator supervises the daily operation of the nursery.

9. Nursery or Greenhouse Worker propagates horticultural plants and maintains the nursery.

10. Extension Agent conducts periodic visits to local farmers, introduces new cultivars, demonstrates new farming techniques, and writes monthly reports to the Chief of Plant Industry Station.

B. Horticultural Jobs in the Private Sector

1. Farm Appraiser determines the current value of a farmstead.

2. Florists arranges flowers for sale.

3. Grower grows flowers for sale.

4. Greenhouse Operator conducts greenhouse activities.

5. Greenhouse Worker maintains the nursery or greenhouse.

6. Garden Shop Operator sells seeds and other agricultural products to non-commercial farmers.

7. Salesman sells agricultural products such as fertilizer, seeds, pesticides, and farm equipment.

HORTICULTURE III
UNIT V - Job Opportunities

NAME_____
DATE_____

UNIT TEST

MATCHING - Match the titles in Column A with the correct job description in Column B

Column A	Column B
_____ a. Entomologist	1. Responsible for overall operation of the station
_____ b. Horticulturist	2. Supervises the daily operation of the nursery and experimental plots
_____ c. Extension Agent	3. Experiments on new cultivars
_____ d. Nursery Operator	4. Identifies insect pests
_____ e. Assistant Horticulturist	5. Assists the entomologist
_____ f. Agriculture Teacher	6. Identifies disease causing organisms
_____ g. Nursery Worker	7. Assists the plant pathologist
_____ h. Plant Pathologist	8. Supervises the daily operation of the nursery
_____ i. Assistant Entomologist	9. Maintains the nursery
_____ j. Assistant Plant Pathologist	10. Demonstrates new farming techniques
	11. Teaches in a high school

List five horticulturally related private job titles.

a. _____ d. _____
b. _____ e. _____
c. _____

Write a job description for each of the horticulturally related private jobs.

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